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Operating Instructions

Process pressure transmitter IPT-1* Vers. 3.0 - metalic sensor

Profibus PA

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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your IPT-1* Vers. 3.0, we offer accessories and replacement parts. The associated documents are:

- Operating instructions manual "*External indicating and adjustment unit*"

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

Mount and set up the pressure transmitter only if you know the applicable national regulations and have the appropriate qualification. You must be aquainted with the regulations and instructions for hazardous areas, measurement and control technology as well as electrical circuits because the pressure transmitter is "electrical equipment" according to EN 50178. Depending on the application conditions, it is necessary that you have appropriate knowledge, e.g. concerning corrosive products or high pressure.

2.2 Appropriate use

IPT-1* Vers. 3.0 is a pressure transmitter for measurement of gauge pressure, absolute pressure and vacuum.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 Safety approval markings and safety tips

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, we provide confirmation of successful testing.

2.7 Fulfillment of NAMUR recommendations

With respect to interference resistance and emitted interference, the NAMUR recommendation NE 21 is fulfilled.

With respect to compatibility, the NAMUR recommendation NE 53 is fulfilled. This applies also to the corresponding indicating and adjustment components. WIKA instruments are generally upward and downward compatible.

- Sensor software for DTM IPT-1* Vers. 3.0 HART, PA or FF
- DTM IPT-1* Vers. 3.0 for adjustment software PACTware
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

The software version of IPT-1* Vers. 3.0 can be determined as follows:

- via PACTware
- on the type label of the electronics
- via the indicating and adjustment module

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.9 Safety instructions for oxygen applications

For instruments in oxygen applications the special instructions in chapters "*Storage and transport*", "*Mounting*" as well as "*Technical data*" under "*Process conditions*"must be noted. Furthermore the valid national regulations, implementation instructions and memorandums of the BG (professional assoc.) must be noted.

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3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- IPT-1* Vers. 3.0 process pressure transmitter
- Documentation
  - this operating instructions manual
  - Operating instructions manual "*Indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Supplementary label "Oil and grease-free for oxygen applications"

Instruments in the version "*Oil and grease-free for oxygen applications*" are equipped with a supplementary label. The supplementary label contains instructions on oil and grease-free parts of the instrument.

Components

IPT-1* Vers. 3.0 consists of the following components:

- Process fitting with measuring cell
- Housing with electronics, optionally available with plug connector
- Housing cover, optionally available with indicating and adjustment module

The components are available in different versions.

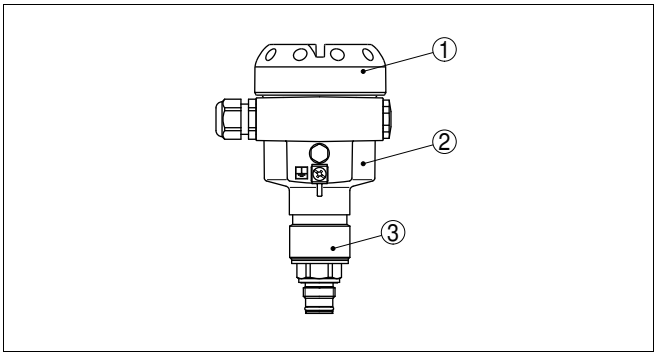

Fig. 1: Example of a IPT-1 Vers. 3.0 with manometer connection G½ A according to EN 837 and Alu housing*
1 Housing cover with integrated indicating and adjustment module (optional)
2 Housing with electronics
3 Process fitting with measuring cell

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number

- Serial number
- Technical data

3.2 Principle of operation

Application area

IPT-1* Vers. 3.0 is a pressure transmitter for measurement of overpressure, absolute pressure or vacuum. Measured products are gases, vapours and liquids in measuring ranges up to 4000 bar (400 MPa); with front-flush version also viscous liquids in measuring ranges up to 600 bar (60 MPa).

Functional principle

The process pressure acts on the sensor element via the stainless steel diaphragm. The process pressure causes a resistance change which is converted into a corresponding output signal and outputted as measured value.[1)]

Power supply and bus communication

Power supply via the Profibus DP/PA segment coupler. A two-wire cable according to Profibus specification serves as carrier of both power and digital data transmission for multiple sensors. The instrument profile of IPT-1* Vers. 3.0 corresponds to profile specification version 3.0.

GSD/EDD

The GSD (instrument master files) and bitmap files necessary for planning your Profibus-DP-(PA) communication network are available from the download section on the WIKA homepage www.wika.com under "*Service"*. There you can also find the appropriate certificates. In a PDM environment, an EDD (Electronic Device Description) is also required to enable the full range of sensor functions (also available as a download).A CD with the appropriate files can be ordered via e-mail under info@de.WIKA.com or by phone from one of the WIKA agencies.

The backlight of the indicating and adjustment module is powered by the sensor. Prerequisite is a certain level of operating voltage.

The data for power supply are specified in chapter "*Technical data*".

This function is available at a later date for instruments with StEx, WHG or ship approval as well as country-specific approvals such as those according to FM or CSA.

3.3 Operation

IPT-1* Vers. 3.0 can be adjusted with different adjustment media:

- with indicating and adjustment module
- the Simatic adjustment program PDM

The entered parameters are generally saved in IPT-1* Vers. 3.0, optionally also in the indicating/adjustment module.

1) Measuring ranges up to 16 bar: piezoresistive sensor element with internal transmission liquid, with measuring ranges up to 25 bar: Strain gauge (DMS) sensor element on the rear of the stainless steel diaphragm (dry).

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Instruments for oxygen applications are sealed in PE foil and provided with a label "Oxygen! Use no Oil". Remove this foil just before mounting the instrument! See instruction under "*Mounting*".

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Suitability for process conditions

Make sure that all parts of the instrument in contact with the measured product, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" in the or on the type label.

Diaphragm protection

Caution:
After removal of the diaphragm protective cover, the diaphragm must not be pressed.

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

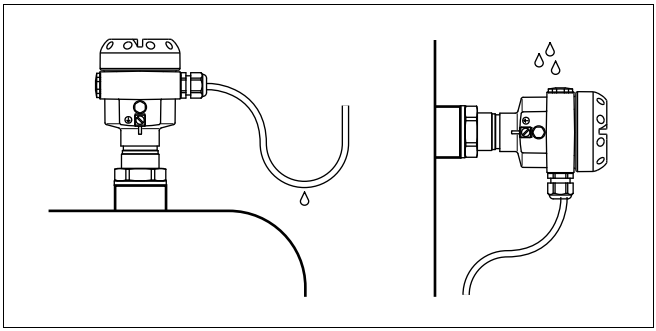

Fig. 2: Measures against moisture penetration

Ventilation and pressure compensation

The ventilation of the measuring cell is realised by a filter element in the socket of the electronics housing. The ventilation of the electronics housing is realised via an additional filter element around the cable glands.[2)]

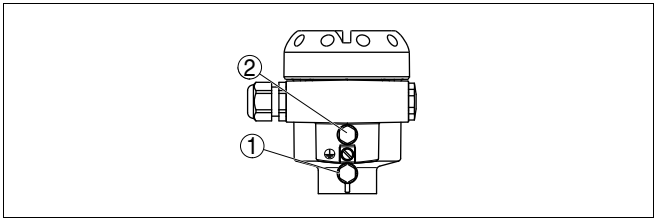

Fig. 3: Position of the filter elements
1 Filter element for ventilation of the measuring cell
2 Filter element for ventilation of the electronics housing

Information:
Make sure that the filter elements are always free of buildup during operation. A pressure washer must not be used for cleaning.

Temperature limits

Higher process temperatures mean often also higher ambient temperatures.

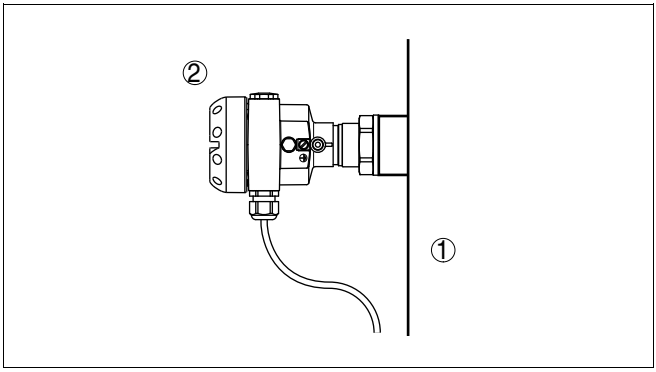

Fig. 4: Temperature ranges
1 Process temperature
2 Ambient temperature

Make sure that the upper temperature limits for the environment of electronics housing and connection cable specified in chapter "*Technical data*" are not exceeded.

[2)] With previous instrument versions, ventilation and pressure compensation were carried out together via a filter element.

Oxygen applications

Danger:
Instruments in the version "*Oil and grease free for oxygen*" should be unpacked just before mounting. After the protective cover of the process fitting has been removed, the label "O_2" on the process fitting is visible. Contamination by oil, grease and dirt should be avoided. Danger of explosion!

4.2 Mounting instructions

Mounting position

IPT-1* Vers. 3.0 functions in any installation position. It is mounted according to the same directives as a manometer (DIN EN 839-2).[3)]

Information:
We recommend using lock fittings, measuring instrument holders and siphons from the line of WIKA accessories.

4.3 Mounting steps

Welding the socket

To mount IPT-1* Vers. 3.0, a welded socket is necessary. Use components from the line of WIKA mounting accessories.

→ Note the applicable welding standards (segment welding procedure) when welding the socket.

Sealing/Screwing in

Use the seal corresponding to the instrument:

- Process fitting GD: Tesnit seal in front of the thread

- or -

Seal the thread with teflon, hemp or a similar resistant seal material:

- Process fitting GN

→ Screw IPT-1* Vers. 3.0 into the welded socket. Tighten the hexagon on the process fitting with a suitable wrench. Wrench size, see chapter "Dimensional drawings".

Warning:
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

[3)] Probable position correction see chapter "Setup steps".

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed according to Profibus specifications

Take note of safety instructions for Ex applications

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Select power supply

Power is supplied via a Profibus DP/PA segment coupler. The power supply range can differ depending on the instrument version. The exact range is stated in the "*Technical data*".

Selecting connection cable

IPT-1* Vers. 3.0 is connected with screened cable according to the Profibus specification. Power supply and digital bus signal are carried over the same two-wire connection cable.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Please make sure that your installation is carried out according to the Profibus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screen directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable screen directly to ground potential at the power supply unit and at the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor must not be connected to ground potential or to another cable screen. The cable screens to the power supply unit and to the next distributor must be connected to each other and also connected to ground potential via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

The total capacitance of the cable and of all capacitors must not exceed 10 nF in Ex applications.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover

2 If an indicating and adjustment module is installed, remove it by turning it slightly to the left.

3 Loosen compression nut of the cable entry

4 Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires

5 Insert the cable through the cable gland into the sensor

6 Lift the opening levers of the terminals with a screwdriver (see following illustration)

7 Insert the wire ends into the open terminals according to the wiring plan

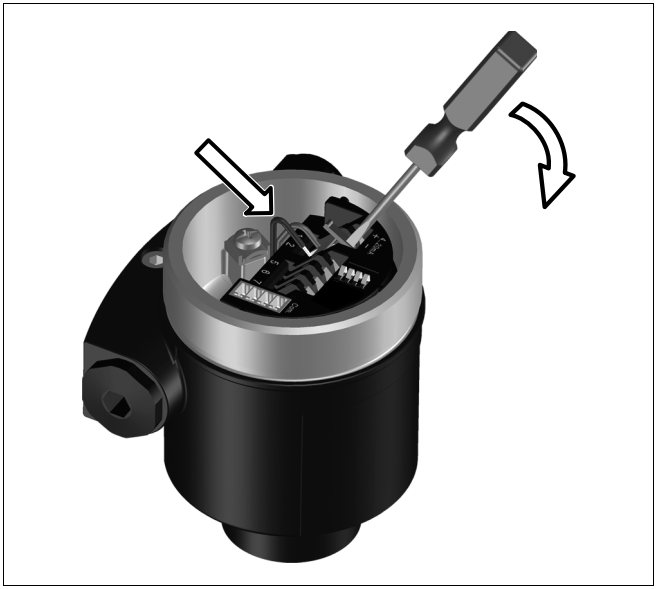

Fig. 5: Connection steps 6 and 7

8 Press down the opening levers of the terminals, you will hear the terminal spring closing

9 Check the hold of the wires in the terminals by lightly pulling on them

10 Connect the screen to the internal ground terminal, connect the outer ground terminal with potential equalisation

11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

12 Screw the housing cover on

The electrical connection is finished.

5.3 Wiring plan, single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Housing overview

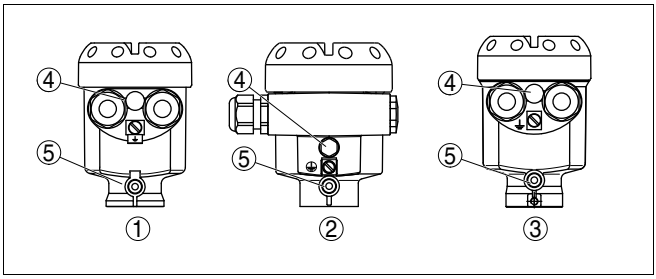

Fig. 6: Material versions, single chamber housing
1 Plastic
2 Aluminium
3 Stainless steel

Electronics and connection compartment

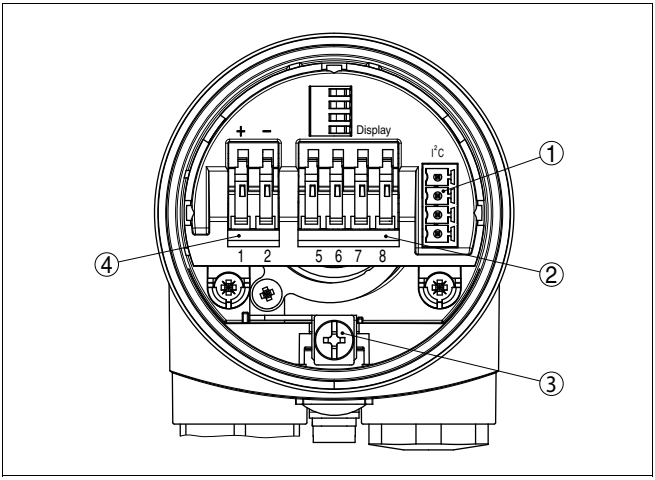

Fig. 7: Electronics and connection compartment, single chamber housing
1 Plug connector for service
2 Spring-loaded terminals for connection of the external indicating and adjustment module
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

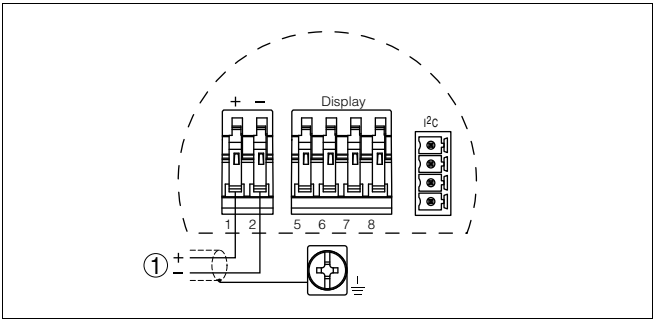

Fig. 8: Wiring plan, single chamber housing
1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Housing overview

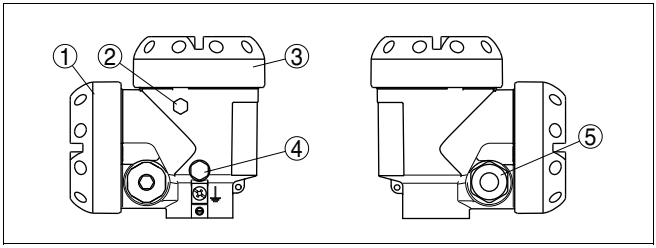

Fig. 9: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for the external indicating and adjustment module (optional)
3 Housing cover, electronics compartment
4 Filter element for air pressure compensation
5 Cable entry or plug

Electronics compartment

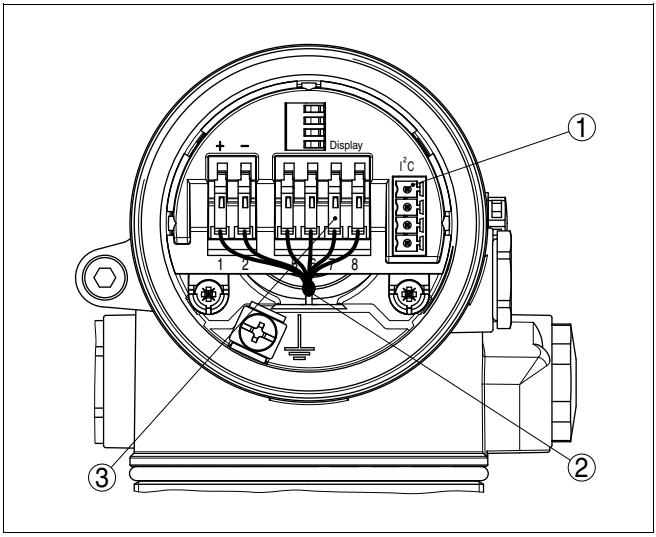

Fig. 10: Electronics compartment, double chamber housing
1 Plug connector for service
2 Internal connection cable to the connection compartment
3 Terminals for the external indicating and adjustment module

Connection compartment

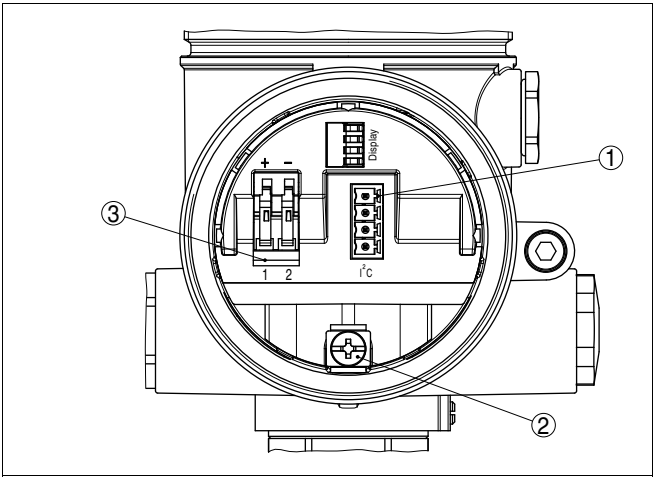

Fig. 11: Connection compartment, double chamber housing
1 Plug connector for service
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for voltage supply

Wiring plan

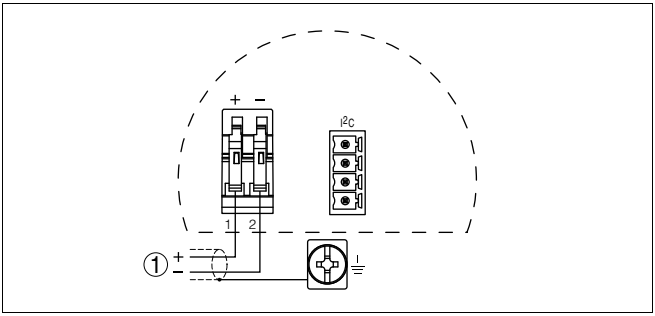

Fig. 12: Wiring plan, double chamber housing
1 Voltage supply/Signal output

5.5 Switch on phase

Switch on phase

After IPT-1* Vers. 3.0 is connected to voltage supply or after voltage recurrence, the instrument carries out a self-check for approx. 30 seconds. The following steps are carried out:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Status byte goes briefly to fault value

Then the current measured value will be displayed and the corresponding digital output signal will be outputted to the cable.[4)]

[4)] The values correspond to the actual measured level as well as to the settings already carried out, e.g. default setting.

6 Set up with the indicating and adjustment module

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the IPT-1* instrument family, in the single as well as double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit

Note:
You can find detailed information on adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted and removed at any time. It is not necessary to interrupt the voltage supply.

For mounting, proceed as follows:

1 Unscrew the housing cover
2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.
4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

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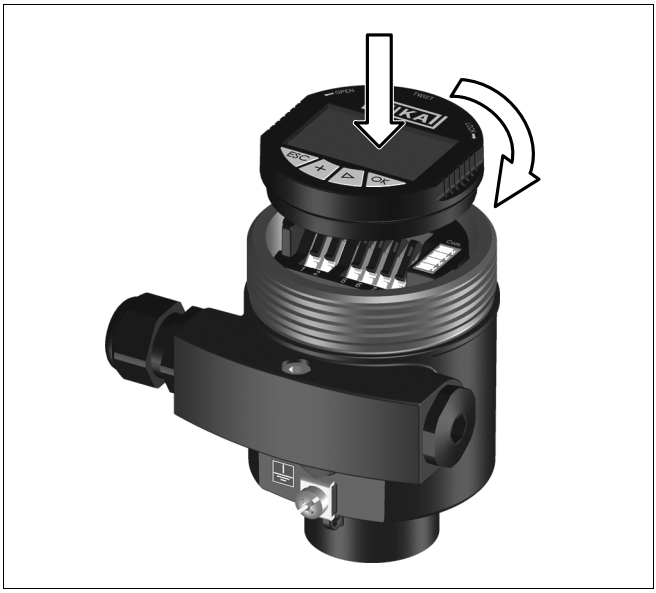


Fig. 13: Mounting the indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

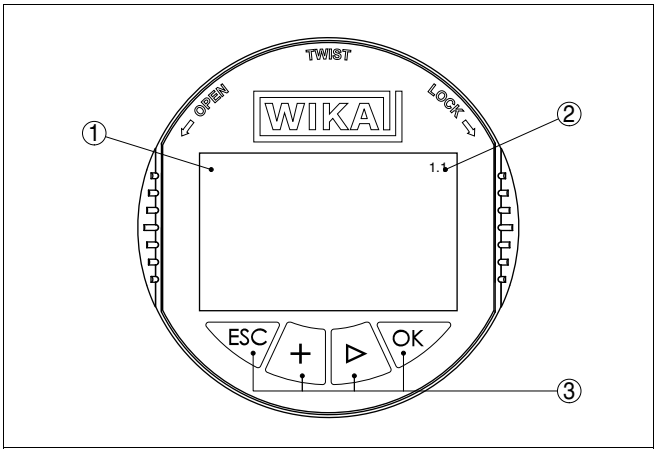


Fig. 14: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Setup procedure

Address setting

Before starting the actual parameter adjustment of a Profibus PA sensor, the address setting must first be carried out. You will find a detailed description in the operating instructions manual of the indicating and adjustment module or in the online help of PACTware or DTM.

Level or process pressure measurement

IPT-1* Vers. 3.0 can be used for level as well as for process pressure measurement. Default setting is level measurement. The mode can be changed in the adjustment menu.

Depending on the application only the respective subchapter "Level or process pressure measurement" is of importance. There, you find the individual adjustment steps.

Level measurement

Parameter adjustment "Level measurement"

Set up IPT-1* Vers. 3.0 in the following sequence:

1 Selecting adjustment unit/density unit
2 Carry out position correction
3 Carrying out min. adjustment
4 Carrying out max. adjustment

In the menu item "*Adjustment unit*" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi…

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

Information:
The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

You can find the data on the type label on the instrument or in the menu items of the min./max. adjustment.

The indicating and adjustment module enables the adjustmetn without filling or pressure. Thanks to this, you can carry out your settings already in the factory without the instrument having to be installed.

The actual measured value is also displayed in the menu items for min./max. adjustment.

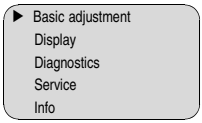
Select unit

In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

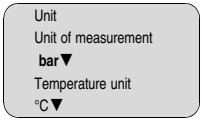
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[5)]

[5)] Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH_2O, mmH_2O.

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.



2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Unit*" will be displayed.



3 Activate the selection with ***[OK]*** and select "***Units of measurement*** with *[->]*.

4 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example mbar).

5 Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is hence switched over from bar to mbar.

Information:
When switching over to adjustment in a height unit (in the example from bar to m), the density also has to be entered.

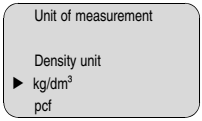
Proceed as follows:

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.

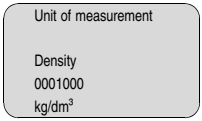
2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Units of measurement*" will be displayed.

3 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example m).

4 Confirm with ***[OK]***, the submenu "*Density unit*" appears.



5 Select the requested unit, e.g. kg/dm³ with ***[->]*** and confirm with ***[OK]***, the submenu "*Density*" appears.



6 Enter the requested density value with ***[->]*** and ***[+]***, confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is hence switched over from bar to m.

Proceed as follows to select the temperature unit:[6)]

→ Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.

→ Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).

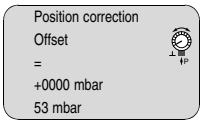
→ Confirm with ***[OK]***.

The temperature unit is hence switched over from °C to °F.

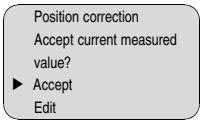
Carry out position correction

Proceed as follows:

1 Activate in the menu item "*Position correction*" the selection with ***[OK]***.



2 Select with ***[->]***, e.g. to accept actual measured value.

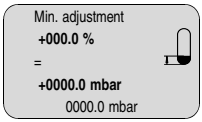


3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carrying out min. adjustment

Proceed as follows:

1 Edit the % value in the menu item "*Min. adjustment*" with ***[OK]***.



2 Set the requested percentage value with ***[+]*** and ***[->]***.

3 Edit the requested mbar value with ***[OK]***.

4 Set the requested mbar value with ***[+]*** and ***[->]***.

5 Confirm with ***[+]*** and move to max. adjustment with ***[->]***.

The min. adjustment is finished.

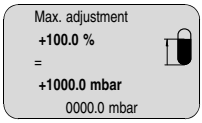
6) Selection options: °C, °F.

Information:
For an adjustment with filling, you simply enter the displayed actual measured value. If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Carrying out max. adjustment

Proceed as follows:

1 Edit the % value in the menu item "*Max. adjustment*" with ***[OK]***.



Information:
The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2 Set the requested percentage value with ***[->]*** and ***[OK]***.

3 Edit the requested mbar value with ***[OK]***.

4 Set the requested mbar value with ***[+]*** and ***[->]***.

5 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

The max. adjustment is finished.

Information:
For an adjustment with filling, you simply enter the displayed actual measured value. If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Process pressure measurement

Parameter adjustment "Process pressure measurement"

Set up IPT-1* Vers. 3.0 in the following sequence:

1 Select application "Process pressure measurement"

2 Select the unit of measurement

3 Carry out position correction

4 Carrying out zero adjustment

5 Carrying out span adjustment

In the menu item "*Adjustment unit*" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi…

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

In the menu items "*zero*" and "*span*" you determine the span of the sensor, the span corresponds to the end value.

Information:
The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

You can find the data on the type label on the instrument or in the menu items of the zero/span adjustment.

The indicating and adjustment module enables the adjustmetn without filling or pressure. Thanks to this, you can carry out your settings already in the factory without the instrument having to be installed.

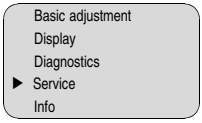
The actual measured value is displayed in addition to the menu items for zero/span adjustment.

Select application "Process pressure measurement"

IPT-1* Vers. 3.0 is preset to application "Level measurement". Proceed as follows when switching over to application "Process pressure measurement":

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.

2 Select the menu "***Service***" with *[->]* and confirm with ***[OK]***.



3 Select the menu item "***Application***" with *[->]* and edit with ***[OK]***.

Warning:
Note the warning: "*Output can change*".

4 Select with ***[->]*** "*OK*" and confirm with ***[OK]***.

5 Select "*Process pressure*" from the list and confirm with ***[OK]***.

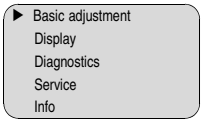
Select unit

In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

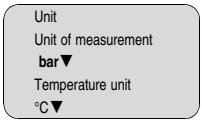
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[7)]

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.

[7)] Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH_2O, mmH_2O.



2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Unit*" will be displayed.



3 Activate the selection with ***[OK]*** and select "***Units of measurement*** with *[->]*.

4 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example mbar).

5 Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is hence switched over from bar to mbar.

Proceed as follows to select the temperature unit:[8)]

→ Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.

→ Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).

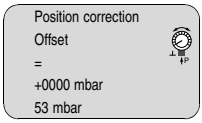
→ Confirm with ***[OK]***.

The temperature unit is hence switched over from °C to °F.

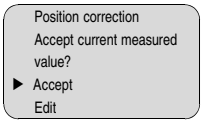
Carry out position correction

Proceed as follows:

1 Activate in the menu item "*Position correction*" the selection with ***[OK]***.



2 Select with ***[->]***, e.g. to accept actual measured value.



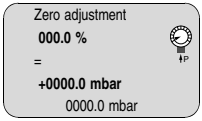
3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

8) Selection options: °C, °F.

Carrying out zero adjustment

Proceed as follows:

1 Edit the mbar value in the menu item "*zero*" with ***[OK]***.



2 Set the requested mbar value with ***[+]*** and ***[->]***.

3 Confirm with ***[+]*** and move to span adjustment with ***[->]***.

The zero adjustment is finished.

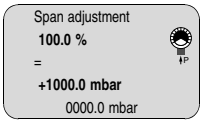
Information:
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

Information:
For an adjustment with pressure, you simply enter the displayed actual measured value. If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Carrying out span adjustment

Proceed as follows:

1 Edit the mbar value in the menu item "*span*" with ***[OK]***.



Information:
The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2 Set the requested mbar value with ***[->]*** and ***[OK]***.

3 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

The span adjustment is finished.

Information:
For an adjustment with pressure, you simply enter the displayed actual measured value. If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Copy sensor data

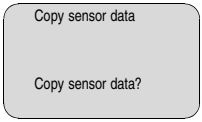
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Scaling unit (Out-Scale unit)
- Positions after the decimal point (scaled)
- Scaling PA/Out-Scale 4 values
- Unit of measurement
- Language

The following safety-relevant data are **not** read out or written:

- Sensor address
- PIN
- Application



Reset

Basic adjustment

If the "*Reset*" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):[9)]

Menu section	Function	Reset value
Basic settings	Unit of measurement	bar
	Temperature unit	°C
	Zero/Min. adjustment	Measuring range begin
	Span/Max. adjustment	Measuring range end
	Density	1 kg/l
	Density unit	kg/l
	Damping	0 s
	Linearisation	linear
	Sensor-TAG	Sensor
Display	Displayed value	PA-Out
Service	Additional PA value	Secondary Value 1
	Out-Scale-Unit	Volume/l
	Scaling	0.00 to 100.0

[9)] Sensor-specific basic adjustment.

Menu section	Function	Reset value
	Decimal point indication	8888.8

The values of the following menu items are *not* reset with "**Reset**:

Menu section	Function	Reset value
Basic settings	Position correction	no reset
Display	Lighting	no reset
Service	Language	no reset
	Application	no reset

Factory setting
Like basic adjustment, furthermore special parameters are reset to default values.[10)]

Pointer
The min. and max. distance values are reset to the actual value.

Optional settings

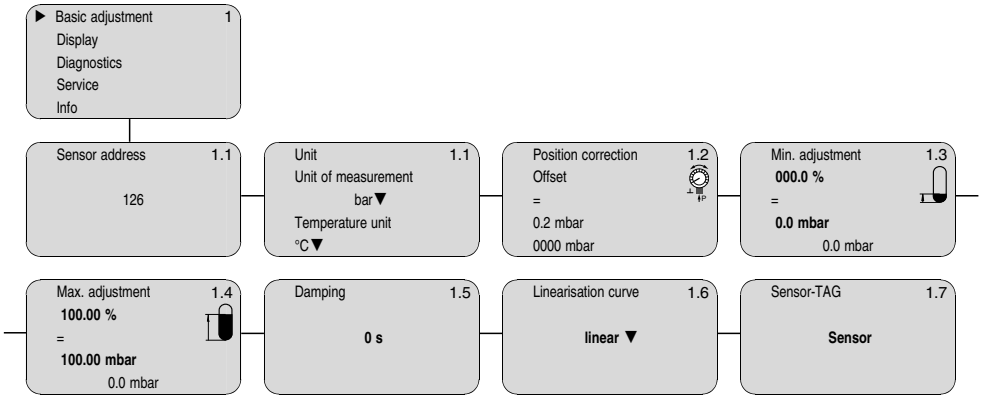
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

[10)] Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

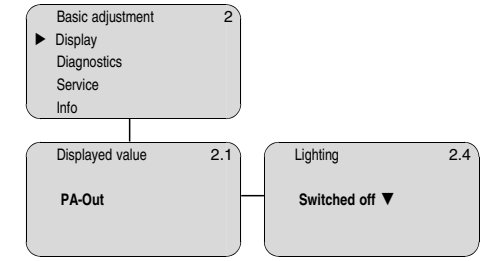
6.5 Menu schematic

Information:
Depending on the version and application, the highlighted menu windows are not always available.

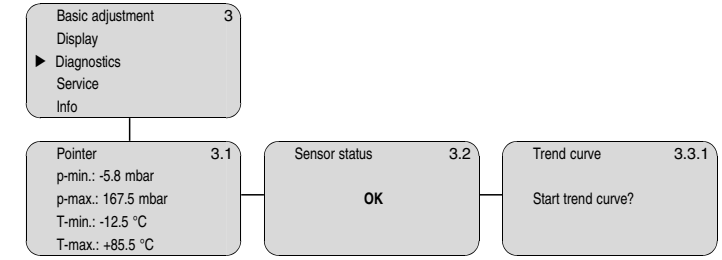
Basic adjustment



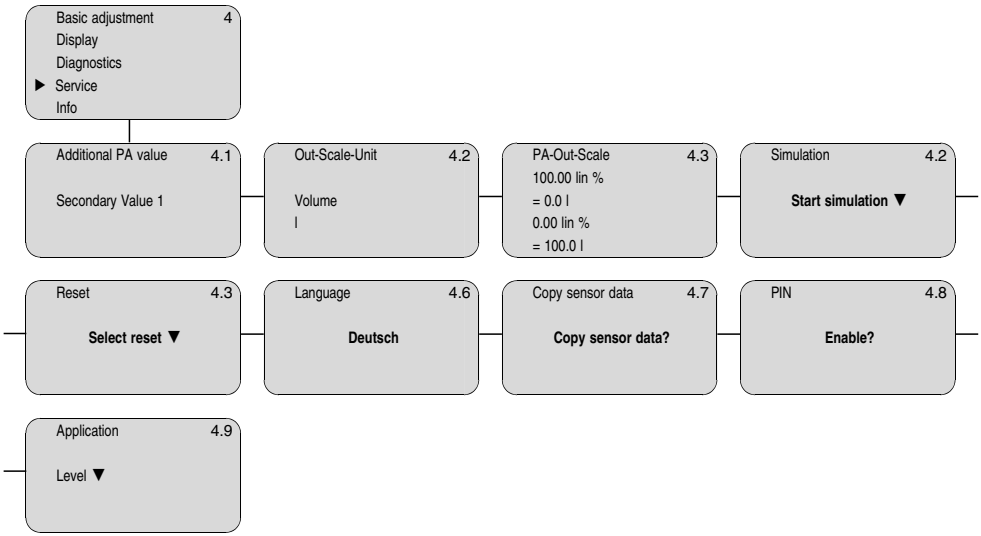
Display



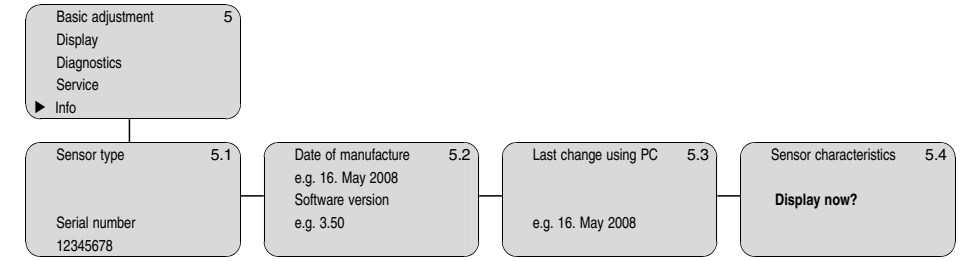
Diagnostics



Service



Info



6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If IPT-1* Vers. 3.0 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

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7 Setup with PDM

7.1 Parameter adjustment with PDM

For WIKA sensors, instrument descriptions for the adjustment program PDM are available as EDD. The instrument descriptions are already implemented in the current version of PDM. For older versions of PDM, a free-of-charge download is available via Internet.

Go via www.wika.com to the item "*Service*".

8 Maintenance and fault rectification

8.1 Maintenance, cleaning

When used in the correct way, no special maintenance is required in normal operation.

In some applications, product buildup on the sensor diaphragm can influence the measuring result. Depending on the sensor and application, take precautions to ensure that heavy buildup, and especially a hardening thereof, is avoided.

If necessary, the transmitter has to be cleaned. In this case, make sure that the materials are resistant against the cleaning detergents.

8.2 Remove interferences

Reaction when malfunctions occur

The operator of the system is responsible for taken suitable measures to remove interferences.

Causes of malfunction

A maximum of reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Power supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined in this way and faults can be rectified.

Checking Profibus PA

? When an additional instrument is connected, the segment fails.

- Max. supply current of the segment coupler exceeded

→ Measure the current consumption, reduce size of segment

? Wrong presentation of the measured value in Simatic S5

- Simatic S5 cannot interpret the number format IEEE of the measured value

→ Insert converting component from Siemens

? In Simatic S7 the measured value is always presented as 0

- Only four bytes are consistently loaded in the PLC

→ Use function component SFC 14 to load 5 bytes consistently

? Measured value on the indicating and adjustment module does not correspond to the value in the PLC
- The menu item "*Display - Display value*" is not set to "*PA-Out*"

→ Check values and correct, if necessary

? No connection between PLC and PA network
- Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate

→ Check data and correct, if necessary

? Instrument does not appear during connection setup
- Profibus DP cable pole-reversed

→ Check cable and correct, if necessary
- Incorrect termination

→ Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification
- Instrument not connected to the segment, double assignment of an address

→ Check and correct, if necessary

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via the indicating/adjustment module

? E013
- no measured value available[11)]

→ Exchange instrument or return instrument for repair

? E017
- Adjustment span too small

→ repeat with modified values

? E036
- no operable sensor software

→ Carry out a software update or send the instrument for repair

? E041
- Hardware error, electronics defective

→ Exchange instrument or return instrument for repair

? E113
- Communication conflict

→ Exchange instrument or return instrument for repair

[11)] Fault message can also appear if the pressure is higher than the nominal range.

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

8.3 Instrument repair

You can download a return form (24 KB) in the Internet from our homepage www.wika.com under the item "*Service*".

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- If necessary, state a contamination
- Clean the instrument and pack it damage-proof
- Attach the completed form and probably a safety data sheet to the instrument
- Please contact the agency serving you for the address of the return shipment

By doing this you help us carry out the repair quickly and without having to call back for needed information.

9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

9.2 Disposal

Note:
When disposing of old instruments, take note of the valid legal and municipal regulations. The appropriate parts must be recycled.

10 Supplement

10.1 Technical data

General data	
Pressure type	Gauge pressure or gauge pressure
Measuring principle	
– Measuring ranges ≤ 16 bar	piezoresistive with internal transmission liquid
– Measuring ranges > 16 bar	Strain gauge (DMS) dry
Service interface	I^2C-Bus

Materials and weights	
316L corresponds to 1.4404 or 1.4435, 316Ti corresponds to 1.4571	
Materials, wetted parts	
– Process fitting	316Ti, Hastelloy C4
– Diaphragm	316Ti, Hastelloy C4
– Diaphragm from measuring range 25 bar, with not flush version	Elgiloy 2.4711
– Seal ring, O-ring	FKM, EPDM, NBR
Materials, non-wetted parts	
– Internal transmission liquid	Synthetic oil, Halocarbon oil[12)13)]
– Housing	Plastic PBT, Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Aluminium housing)
– Inspection window in housing cover for indicating and adjustment module	Polycarbonate (UL-746-C listed)
– Ground terminal	316Ti/316L
Weight approx.	1.2 kg (2.646 lbs)

Output variable	
Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA

Dynamic behaviour output	
Run-up time approx.	10 s

12) Synthetic oil for measuring ranges up to 16 bar, FDA listed for the food processing industry. For measuring ranges up to 25 bar dry measuring cell.

13) Halocarbon oil: Generally in oxygen applications, not with vacuum measuring ranges, not with absolute measuring ranges < 1 bar_{abs}.

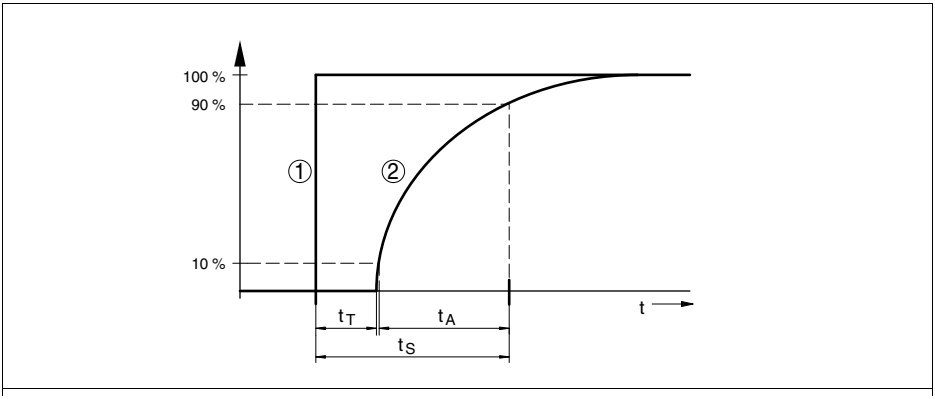

Fig. 15: Sudden change of the process variable, dead time t_T, rise time t_A and step response time t_S
1 Process variable
2 Output signal

Dead time	≤ 150 ms
Rise time	≤ 100 ms (10 … 90 %)
Step response time	≤ 250 ms (ti: 0 s, 10 … 90 %)
Damping (63 % of the input variable)	0 … 999 s, adjustable

Input variable

Adjustment

Adjustment range of the min./max. adjustment relating to the nominal measuring range:

- Min. -5 … +95 %
- Max. -5 … +105 %

Adjustment range of the zero/span adjustment relating to the nominal measuring range:

- zero -5 … +95 %
- Span -5 … +105 %

Recommended max. turn down 10 : 1 (no limitation)

Nominal measuring ranges and overload resistance

Nominal range	Overload, max. pressure	Overload, min. pressure
Gauge pressure		
0 … 0.4 bar/0 … 40 kPa	2 bar/200 kPa	-1 bar/-100 kPa
0 … 1.6 bar/0 … 160 kPa	10 bar/1000 kPa	-1 bar/-100 kPa
0 … 16 bar/0 … 1.6 MPa	80 bar/8 MPa	-1 bar/-100 kPa
0 … 40 bar/0 … 4 MPa	80 bar/8 MPa	-1 bar/-100 kPa
0 … 100 bar/0 … 10 MPa	200 bar/20 MPa	-1 bar/-100 kPa
0 … 250 bar/0 … 25 MPa	500 bar/50 MPa	-1 bar/-100 kPa
0 … 600 bar/0 … 60 MPa	1200 bar/120 MPa	-1 bar/-100 kPa

Nominal range	Overload, max. pressure	Overload, min. pressure
-1 … 3 bar/-100 … 300 kPa	17 bar/1700 kPa	-1 bar/-100 kPa
-1 … 5 bar/-100 … 500 kPa	35 bar/3500 kPa	-1 bar/-100 kPa
-1 … 15 bar/-100 … 1.5 MPa	80 bar/8 MPa	-1 bar/-100 kPa
Absolute pressure		
0 … 0.4 bar/0 … 40 kPa	2 bar/200 kPa	0 bar abs.
0 … 1.6 bar/0 … 160 kPa	10 bar/1000 kPa	0 bar abs.
0 … 6 bar/0 … 600 kPa	35 bar/3500 kPa	0 bar abs.
0 … 16 bar/0 … 1.6 MPa	80 bar/8 MPa	0 bar abs.

Reference conditions and actuating variables (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

- Temperature +18 … +30 °C (+64 … +86 °F)
- Relative humidity 45 … 75 %
- Air pressure 860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)

Determination of characteristics: Limit point adjustment according to IEC 61298-2

Characteristics: linear

Reference installation position: upright, diaphragm points downward

Influence of the installation position: depending on the isolating diaphragm version

Deviation determined according to the limit point method according to IEC 60770[14)]

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Deviation for measuring ranges 0.4 … 1000 bar

- Turn down 1 : 1 up to 5 : 1 < 0.1 %
- Turn down > 5 : 1 < 0.02 % x TD

Deviation for measuring ranges > 1000 bar

- Turn down 1 : 1 up to 2 : 1 < 0.6 %

Deviation with absolute pressure measuring range 0.1 bar

- Turn down 1 : 1 up to 5 : 1 < 0.25 %
- Turn down > 5 : 1 < 0.05 % x TD

Influence of the product or ambient temperature

Applies to instruments with **digital** signal output (HART, Profibus PA, Foundation Fieldbus) as well as to instruments with **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

14) Incl. non-linearity, hysteresis and non-repeatability.

Thermal change zero zignal, reference temperature 20 °C (68 °F):

- In the compensated temperature range 0 … +100 °C (+32 … +212 °F) < 0.05 %/10 K x TD
- Outside the compensated temperature range typ. < 0.05 %/10 K x TD

Applies also to instruments with **analogue** 4 … 20 mA current output and refers to the set span.

Thermal change, current output < 0.15 % at -40 … +80 °C (-40 … +176 °F)

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Long-term drift of the zero signal < (0.1 % x TD)/year

Ambient conditions

Ambient, storage and transport temperature

- Standard version -40 … +80 °C (-40 … +176 °F)
- Standard version with indicating and adjustment module -15 … +70 °C (+5 … +158 °F)
- Connection G1 A front-flush according to EHEDG -10 … +80 °C (+14 … +176 °F)
- Fitting G1 A front-flush according to EHEDG with indicating and adjustment module -10 … +70 °C (+14 … +158 °F)
- Version for oxygen applications[15] -40 … +60 °C (-40 … +140 °F)
- Version for oxygen applications with indicating and adjustment module[16] -15 … +60 °C (+5 … +140 °F)

Process conditions

The specifications are used as an overview. For pressure stage and product temperature the specifications on the type plate are applicable.

Product temperature standard, depending on the seal[17]

- FKM (VP2/A) -20 … +105 °C (-4 … +221 °F)
- EPDM (A+P 75.5/KW75F) -40 … +105 °C (-40 … +221 °F)
- NBR (COG) -20 … +105 °C (-4 … +221 °F)

Product temperature front-flush threaded fitting G1 A according to EHEDG, threaded fitting M44 x 1.25 as well as hygienic fittings, depending on seal[18] [19]

15) Up to 60 °C (140 °F).
16) Up to 60 °C (140 °F).
17) Version for oxygen applications up to 60 °C (140 °F).
18) Not with hygienic fitting with compression nut F40 PN40/316L
19) Version for oxygen applications up to 60 °C (140 °F).

– FKM (VP2/A)	-20 … +150 °C (-4 … +302 °F)
– EPDM (A+P 75.5/KW75F)	-30 … +150 °C (-22 … +302 °F)
– NBR (COG)	-20 … +150 °C (-4 … +302 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[20]
Shock resistance	Acceleration 100 g/6 ms[21]

Electromechanical data - version IP 66/IP 67

Cable entry/plug[22]	
– Single chamber housing	• 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
– Double chamber housing	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment module (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for the external indicating and adjustment module (optional) or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment module (optional)
Spring-loaded terminals for wire cross-section up to	2.5 mm² (AWG 14)

Indicating and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40

[20] Tested according to the regulations of German Lloyd, GL directive 2.
[21] Tested according to EN 60068-2-27.
[22] Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

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Materials	
– Housing	ABS
– Inspection window	Polyester foil

Power supply

Operating voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
– EEx-d instrument	9 … 32 V DC
Operating voltage with lighted indicating and adjustment module	
– Non-Ex instrument	13 … 32 V DC
– EEx-ia instrument	13 … 24 V DC
– EEx-d instrument	13 … 32 V DC
Power supply by	DP/PA segment coupler
max. number of sensors	32 (10 with Ex)

Electrical protective measures

Protection	
– Housing, standard	IP 66/IP 67[23)]
Overvoltage category	III
Protection class	II

Approvals

Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They are included in the scope of delivery.

[23)] Instruments with gauge pressure measuring ranges cannot detect the ambient pressure when submerged, e.g. in water. This can lead to falsification of the measured value.

10.2 Information on Profibus PA

Instrument master file

The instrument master file (GSD) contains the characteristic data of the Profibus PA instrument. These data are, e.g. the permissible transmission rates as well as information on diagnostics values and the format of the measured value outputted by the PA instrument.

A bitmap file is also provided for the Profibus network planning tool. This file is installed automatically when the GSD file is integrated. The bitmap file is used for symbolic indication of the PA instrument in the configuration tool.

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For IPT-1* Vers. 3.0 the ID number is **0 x 076F(hex)** and the GSD file **BR__076F.GSD**. As an option to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For IPT-1* Vers. 3.0 you have to use the general GSD file **PA139701.GSD**. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.

Note:
When using the profile-specific GSD file, the PA-OUT value as well as the temperature value are transmitted to the PLC (see block diagram "*Cyclical data traffic*").

Cyclical data traffic

The master class 1 (e.g. PLC) cyclically reads out measured values from the sensor during operation. The below block diagram below shows which data can be accessed by the PLC.

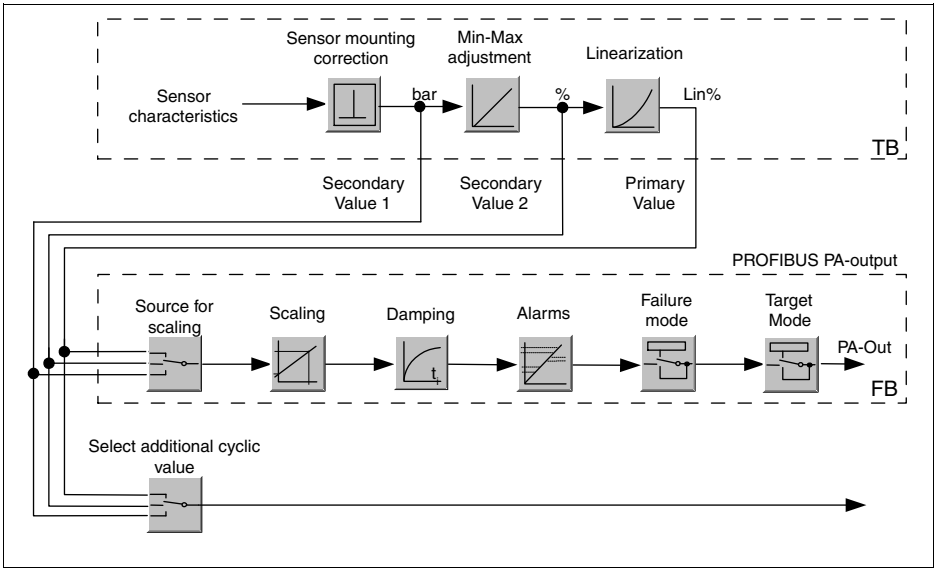

Fig. 16: IPT-1 Vers. 3.0: Block diagram with AI (PA-OUT) value and Additional Cyclic Value*

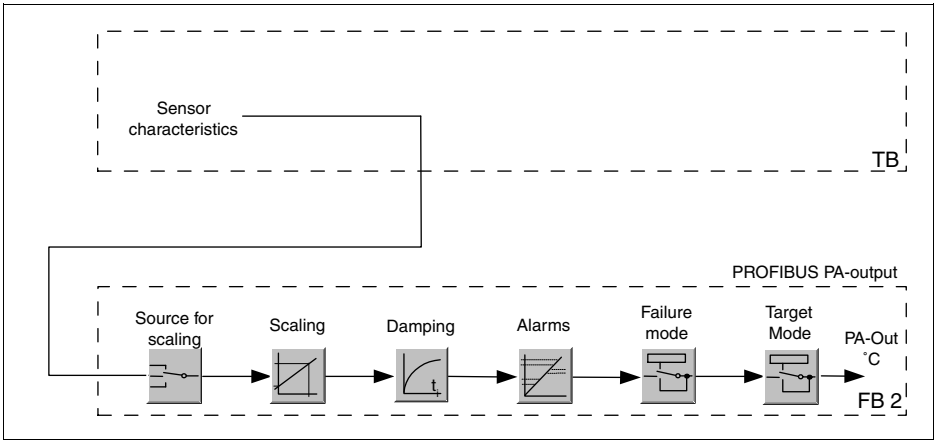

Fig. 17: IPT-1 Vers. 3.0: Block diagram with temperature value*

Module of the PA sensors
For the cyclic data traffic, IPT-1* Vers. 3.0 provides the following modules:

- AI (PA-OUT)

- PA-OUT value of the FB1 after scaling
- Temperature
- PA-OUT value of the FB2 after scaling
- Additional Cyclic Value
- Additional cyclical value (depending on the source)
- Free Place
- This module must be used if a value should not be used in the data telegram of the cyclical data traffic (e.g. replacement of the temperature and Additional Cyclic Value)

Max. three modules can be active. By means of the configuration software of the Profibus master, you can determine the configuration of the cyclical data telegram with these modules. The procedure depends on the respective configuration software.

Tip:
The modules are available in two versions:

- Short for Profibus master supporting only one "Identifier Format" byte, e.g. Allen Bradley
- Long for Profibus master only supporting the "Identifier Format" byte, e.g. Siemens S7-300/400

Examples of telegram configuration
In the following you will see how the modules can be combined and how the appendant data telegram is structured.

Example 1 (standard setting) with pressure value, temperature value and additional cyclical value:

- AI (PA-OUT)
- Temperature
- Additional Cyclic Value

Byte-No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Format	IEEE-754-Flieskommazahl				Status	IEEE-754-Flieskommazahl				Status	IEEE-754-Flieskommazahl				Status
Value	PA-OUT (FB1)				Status (FB1)	Temperature (FB2)				Status (FB2)	Additional Cyclic Value				Status

Fig. 18: Telegram configuration example 1

Example 2 with pressure value and temperature value without additional cyclical value:

- AI (PA-OUT)
- Temperature
- Free Place

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Flieskommazahl				Status	IEEE-754-Flieskommazahl				Status
Value	PA-OUT (FB1)				Status (FB1)	Temperature (FB2)				Status (FB2)

Fig. 19: Telegram configuration example 2

Example 3 with pressure value and additional cyclical value without temperature value:

- AI (PA-OUT)
- Free Place
- Additional Cyclic Value

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Additional Cyclic Value				Status

Fig. 20: Telegram configuration example 3

Data format of the output signal

Byte4	Byte3	Byte2	Byte1	Byte0
Status	Value (IEEE-754)			

Fig. 21: Data format of the output signal

The status byte corresponds to profile 3.0 "Profibus PA Profile for Process Control Devices" coded. The status "Measured value OK" is coded as 80 (hex) (Bit7 = 1, Bit6 … 0 = 0).

The measured value is transferred as a 32 bit floating point number in the IEEE-754 format.

Byte n								Byte n+1								Byte n+2								Byte n+3							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VZ	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}
Sign Bit	Exponent							Significant								Significant								Significant							

$$\text{Value} = (-1)^{VZ} \bullet 2^{(\text{Exponent} - 127)} \bullet (1 + \text{Significant})$$

Fig. 22: Data format of the measured value

Coding of the status byte associated with the PA output value

Status code	Description according to Profibus standard	Possible cause
0x00	bad - non-specific	Flash-Update active
0x04	bad - configuration error	• Adjustment error • Configuration error with PV-Scale (PV-Span too small) • Unit irregularity • Error in the linearization table
0x0C	bad - sensor failure	• Hardware error • Converter error • Leakage pulse error • Trigger error
0x10	bad - sensor failure	• Measured value generation error • Temperature measurement error
0 x 1f	bad - out of service constant	"Out of Service" mode switched on
0 x 44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0 x 48	uncertain substitute set	• Switch on simulation • Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0 x 4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0 x 51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0 x 52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0 x 80	good (non-cascade) - OK	OK
0 x 84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category was written)
0 x 89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm
0 x 8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0 x 8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0 x 8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

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10.3 Dimensions

Housing

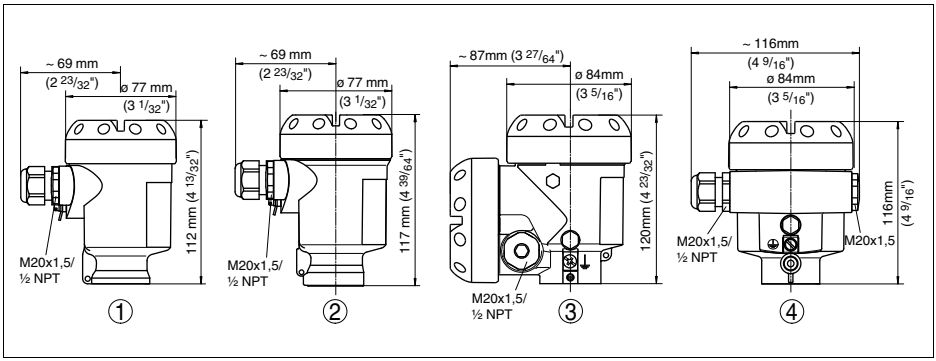

Fig. 23: Housing versions (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)
1 Plastic housing
2 Stainless steel housing
3 Aluminium double chamber housing
4 Aluminium housing

IPT-1* Vers. 3.0 - threaded fitting

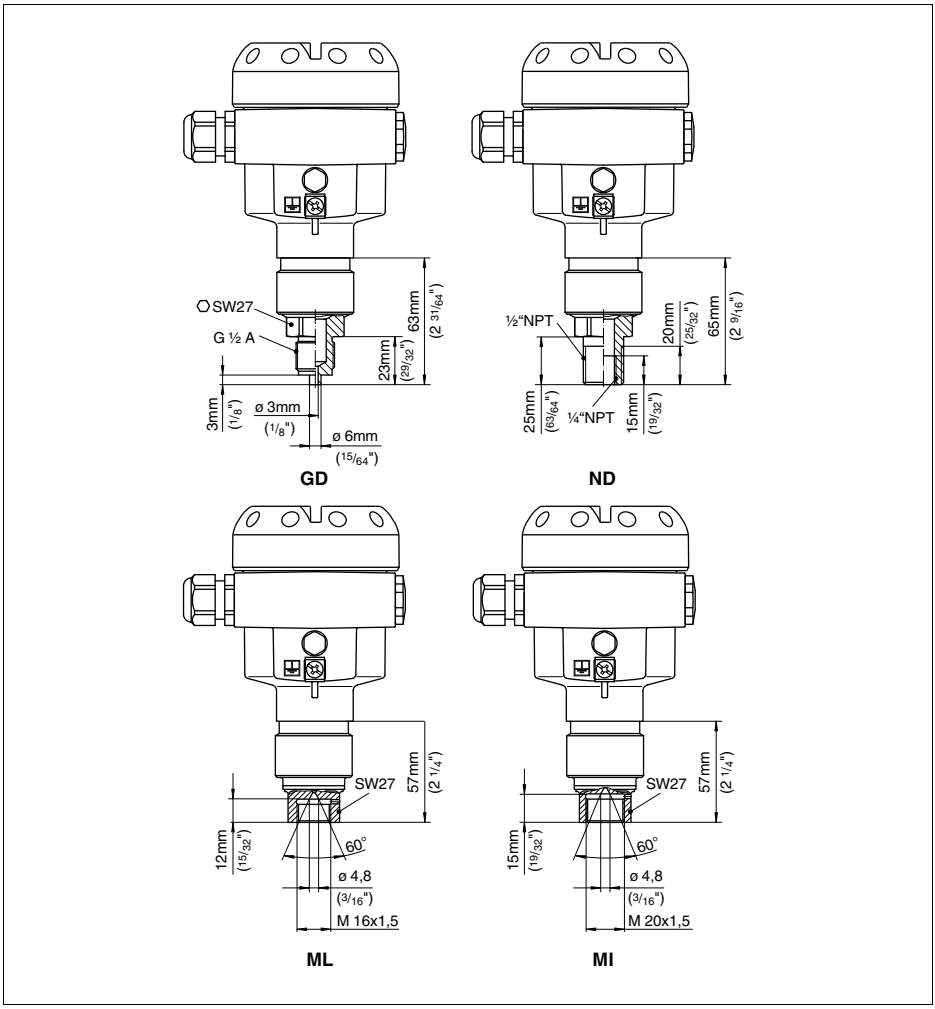

Fig. 24: IPT-1 Vers. 3.0 GD = G½ EN 837, ND = ½ NPT, ML = M16 x 1.5 inner, MI = M20 x 1.5 inner*

IPT-1* Vers. 3.0 - front-flush connection, part 1

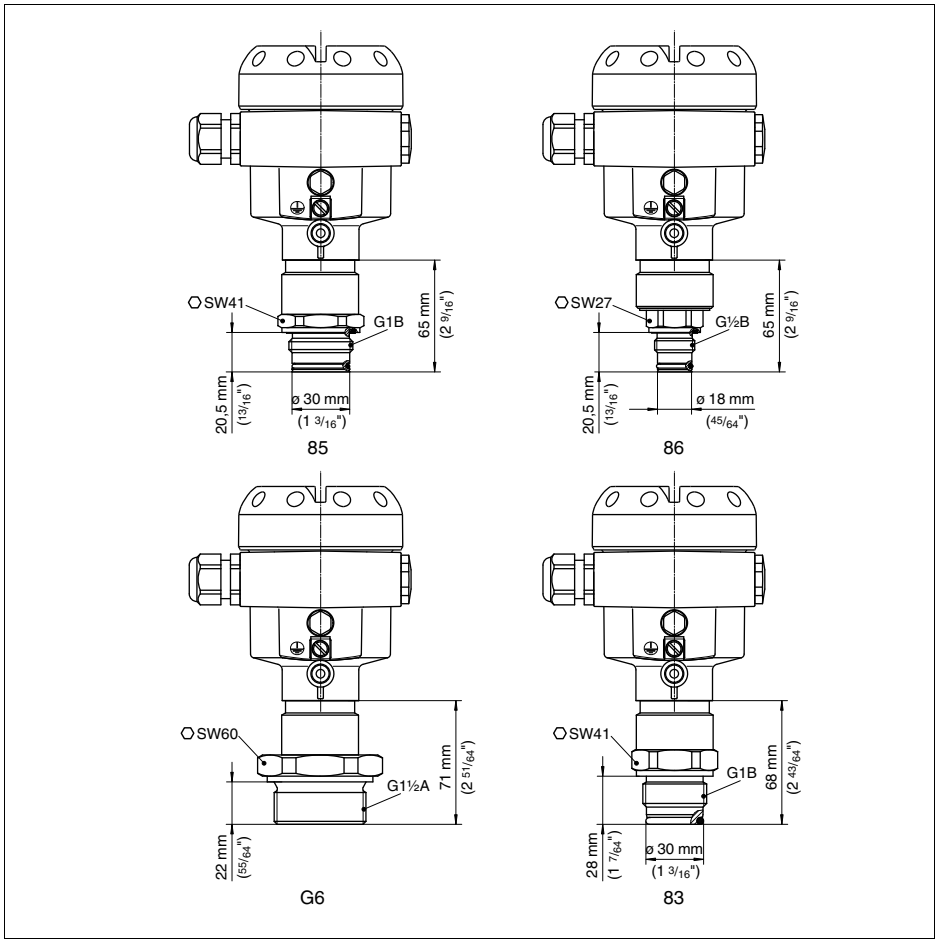

Fig. 25: IPT-1 Vers. 3.0 85 = G1 A front-flush 0 … 0.4 bar and 0 … 1.6 bar, 86 = G½ A front-flush > 1.6 bar, 84 = G1 A front-flush up to 150 °C according to EHEDG 0 … 0.4 bar and 0 … 16 bar*

IPT-1* Vers. 3.0 - front-flush connection, part 2

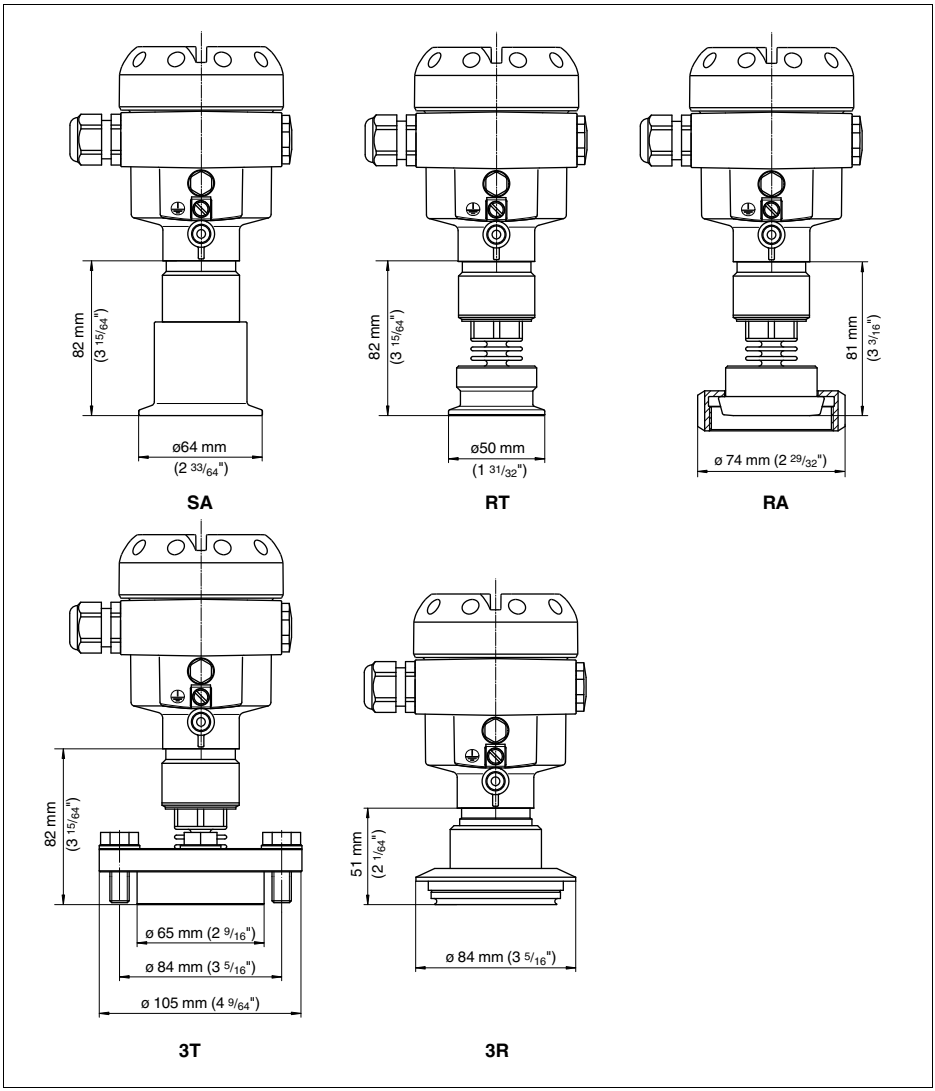

Fig. 26: IPT-1 Vers. 3.0 - SA = Tri-Clamp 2", RA = bolting DN 40/PN 40 according to DIN 11851, RT = Tri-Clamp 1½", 3T = DRD, 3R = Varivent Form F*

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